

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claims 1-42 (canceled)

1 43.(new) A device comprising:
2 a first module configured to receive video images and to identify objects of interest in
3 response to the video images;
4 a second module coupled to the first module and configured to classify a plurality of
5 shape and posture categories based on a plurality of observed states of the objects of interest;
6 and
7 a third module coupled to the second module, wherein the third module is configured
8 to identify behaviors of the objects of interest in response to the plurality of shape and posture
9 categories and to characterize the behaviors of the objects of interest in response to standard
10 object behaviors.

1 44.(new) The device of claim 43, wherein the second module further obtains feature
2 information by tracking the objects of interest over a plurality of video images.

1 45.(new) The device of claim 44, wherein the characterizing of the behaviors of the
2 objects of interest further includes comparing feature information of the objects of interest
3 with predefined categories exhibited by the standard object behaviors.

1 46.(new) The device of claim 44, wherein the characterizing of the behaviors of the
2 objects of interest further includes identifying one of eating, rearing, jumping, drinking,
3 running, walking, chewing, grooming, hanging, cuddling, landing vertically, repetitively
4 jumping, circling, sleeping, twitching, awakening, digging, foraging, sniffing, pausing,
5 urinating, stretching, licking, scratching, spinning, sitting, standing, and lying of the objects of
6 interest.

1 47.(new) The device of claim 43, wherein the first module is an object identification
2 and segregation module that identifies and segregates predetermined types of objects from the
3 video images.

1 48.(new) The device of claim 47, wherein the second module further includes:
2 an object tracking module configured to track the objects of interest in a series of
3 video image frames; and
4 an object shape and posture classifier coupled to the object tracking module and
5 configured to provide the plurality of shape and posture categories.

1 49.(new) The device of claim 48, wherein the third module includes a behavior
2 identification module, which is coupled to a standard object behavior storage module.

1 50.(new) A system for characterizing activity of objects comprising:
2 a video camera;
3 a video digitization unit;
4 a digital processing unit that includes:
5 a device of claim 43; and

6 a memory device.

1 51.(new) A method of characterizing an activity comprising:
2 obtaining a stream of video image frames from a monitoring device;
3 identifying objects of interest from the stream of video image frames;
4 providing feature information of the objects of interest in response to the stream of
5 video image frames;
6 classifying postures of the objects of interest in response to the feature information;
7 obtaining standard object behaviors from a storage memory device; and
8 characterizing the behaviors of the objects of interest in response to comparison
9 between the postures of the objects of interest and the standard object behaviors, wherein the
10 characterizing the behaviors of the objects of interest further includes analyzing temporal
11 ordering of the primitives.

1 52.(new) The method of claim 51, wherein the analyzing temporal ordering of the
2 primitives further includes utilizing time-series analysis to identify a transition from a
3 previous behavior primitive to a next behavior primitive.

1 53.(new) The method of claim 52, wherein the time-series analysis further includes
2 employing Hidden Markov Model (HMMs).

1 54.(new) The method of claim 51, wherein the providing feature information further
2 includes tracking physical changes of the objects of interest over multiple video image
3 frames.

1 55.(new) The method of claim 51, wherein the identifying objects of interest from the
2 stream of video image frames further includes detecting foreground objects of interest from
3 the video image frames.

1 56.(new) The method of claim 55, wherein the detecting foreground objects of
2 interest further includes subtracting a background utilizing a background subtraction
3 algorithm.

1 57.(new) The method of claim 51, wherein the identifying objects of interest further
2 includes identifying humans, vehicles, and other moving and non-moving objects.

1 58.(new) The method of claim 51, wherein the identifying objects of interest further
2 includes identifying an animal.

1 59.(new) The method of claim 58, wherein the identifying an animal further includes
2 identifying a biological mouse or rat.

1 60.(new) The method of claim 51, wherein the classifying postures of the objects of
2 interest further includes:
3 describing a sequence of postures as behavior primitives; and
4 aggregating behavior primitives to identify behaviors of the objects of interest over a
5 plurality of video image frames.

1 61.(new) The method of claim 60, wherein the identifying of postures of the objects
2 of interest includes detecting the shapes of the objects of interest.

1 62.(new) The method of claim 51, wherein the characterizing the behaviors of the
2 objects of interest further includes identifying one of eating, rearing, jumping, drinking,
3 running, walking, chewing, grooming, hanging, cuddling, landing vertically, repetitively
4 jumping, circling, sleeping, twitching, awakening, digging, foraging, sniffing, pausing,
5 urinating, stretching, licking, scratching, spinning, sitting, standing, and lying of the objects of
6 interest.

1 63.(new) The method of claim 51, wherein the identifying an objects of interest
2 further includes detecting one of vertical position side view, horizontal position side view,
3 vertical position front view, horizontal position front view, and moving of the objects of
4 interest.

1 64.(new) An apparatus for characterizing an activity comprising:
2 means for obtaining a stream of video image frames from a monitoring device;
3 means for identifying objects of interest from the stream of video image frames;
4 means for providing feature information of the objects of interest in response to the
5 stream of video image frames;
6 means for classifying postures of the objects of interest in response to the feature
7 information;
8 means for obtaining standard object behaviors from a storage memory device; and
9 means for characterizing the behaviors of the objects of interest in response to
10 comparison between the postures of the objects of interest and the standard object behaviors;
11 wherein the means for characterizing further includes means for analyzing temporal ordering
12 of the primitives using transitional information from a previous behavior primitive to a next

13 behavior primitive; wherein the means for analyzing temporal ordering of the primitives
14 further includes means for utilizing Hidden Markov Model time-series analysis.

1 65.(new) The apparatus of claim 64, wherein the means for providing feature
2 information further includes means for tracking physical changes of the objects of interest
3 over multiple video image frames.

1 66.(new) The apparatus of claim 64, wherein the means for identifying objects of
2 interest from the stream of video image frames further includes means for detecting
3 foreground objects of interest from the video image frames.

1 67.(new) The apparatus of claim 66, wherein the means for detecting foreground
2 objects of interest further includes means for subtracting a background utilizing a background
3 subtraction algorithm.

1 68.(new) The method of claim 64, wherein the means for identifying objects of
2 interest further includes means for identifying humans, vehicles, and other moving and non-
3 moving objects.

1 69. (new) The apparatus of claim 64, wherein the means for identifying objects of
2 interest further includes means for identifying an animal.

1 70. (new) The apparatus of claim 69, wherein the means for identifying an animal
2 further includes means for identifying a biological mouse or rat.

1 71. (new) The apparatus of claim 64, wherein the means for classifying postures of
2 the objects of interest further includes:

3 means for describing a sequence of postures as behavior primitives; and

4 means for aggregating behavior primitives to identify behaviors of the objects of
5 interest over a plurality of video image frames.

1 72.(new) The apparatus of claim 71, wherein the means for identifying of postures of
2 the objects of interest includes means for detecting shapes of the objects of interest.

1 73.(new) The apparatus of claim 64, wherein the means for characterizing the
2 behaviors of the objects of interest further includes means for identifying one of eating,
3 rearing, jumping, drinking, running, walking, chewing, grooming, hanging, cuddling, landing
4 vertically, repetitively jumping, circling, sleeping, twitching, awakening, digging, foraging,
5 sniffing, pausing, urinating, stretching, licking, scratching, spinning, sitting, standing, and
6 lying of the objects of interests.

1 74.(new) The apparatus of claim 64, wherein the means for identifying objects of
2 interest further includes means for detecting one of vertical position side view, horizontal
3 position side view, vertical position front view, horizontal position front view, and moving of
4 the objects of interest.

1 75.(new) A machine-readable medium having stored thereon computer executable
2 instructions, which cause a digital processing system to perform a function, the function
3 comprising:

4 obtaining a stream of video image frames from a monitoring device;

5 identifying objects of interest from the stream of video image frames;
6 providing feature information of the objects of interest in response to the stream of
7 video image frames;
8 classifying postures of the objects of interest in response to the feature information;
9 obtaining standard object behaviors from a storage memory device; and
10 characterizing the behaviors of the objects of interest in response to comparison
11 between the postures of the objects of interest and the standard object behaviors, wherein the
12 characterizing the behaviors of the objects of interest further includes analyzing temporal
13 ordering of the primitives.

1 76.(new) The machine-readable medium of claim 75, wherein the analyzing temporal
2 ordering of the primitives further includes utilizing time-series analysis to identify a transition
3 from a previous behavior primitive to a next behavior primitive.

1 77.(new) The machine-readable medium of claim 76, wherein the time-series analysis
2 further includes employing Hidden Markov Model (HMMs).

1 78.(new) The machine-readable medium of claim 75, wherein the providing feature
2 information further includes tracking physical changes of the objects of interest over multiple
3 video image frames.

1 79.(new) The machine-readable medium of claim 75, wherein the identifying objects
2 of interest from the stream of video image frames further includes detecting foreground
3 objects of interest from the video image frames.

- 1 80.(new) The machine-readable medium of claim 79, wherein the detecting
- 2 foreground objects of interest further includes subtracting a background utilizing a
- 3 background subtraction algorithm.